

REMARKS

Claims 1-9 currently are pending. Claim 9 has been amended.

Claim 9 is rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The examiner rejected the claim because it does not have any positively recited steps. In response, applicants amend the claim into a product claim. The amendment has its basis in the current specification, on page 4, lines 28-31.

Claims 6-8 are rejected under 35 USC § 102(b) as anticipated by or, in the alternative, under 35 USC § 103(a) as obvious over Williams (US 5,928,985).

The examiner stated that Williams discloses a passivated copper and zinc oxide and/or alumina catalyst and its use for the process of carbon monoxide shift reaction. The examiner also stated that in the event any differences can be shown for the product of the product by process claim 6 as opposed to the product taught by Williams, such differences would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results.

Applicants believe Williams does not teach to calcine the solid catalyst precursor to an anion content from the precipitating agent of from 0.1 to 2.5% by weight. Examples 1-3 of Williams is silent about the calcinating step because the examples only describe the passivating procedure starting from pelleted copper catalyst precursors which are already calcined. Anticipation can only be established by a single

prior art reference which discloses each and every element of the claimed invention.

RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984).

Claims 6 and 8 were also rejected as being obvious over Williams (US 5,928,985).

The main difference between the process of the present invention and the preparation procedure of the catalyst precursors according to Williams is that according to the present invention the calcination is achieved to a content of the precipitating agent of from 0.1 to 2.5% by weight. This is not rendered obvious by Williams. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 2143. The examiner has not met any of these three requirements.

Williams covers copper catalysts which have been passivated by a special technique. The starting problem of Williams is that during reactions, e.g., hydrogenations, shift reactions, the known catalysts tend to lose their activity. According to Williams, passivation of copper catalysts with carbon dioxide and oxygen results in a stable passivated catalyst. Therefore, Williams deals mainly with the

passivating of said copper catalysts. It is not important how the copper precursor catalysts are prepared according to Williams. This can be seen from the three alternatives which are mentioned in Williams for the preparations of the precursor catalyst. In column 2, line 42 to column 3, line 5 it is mentioned that the catalyst precursors can be prepared by mixing of the copper compound with any other desired ingredients of the precursor or, by precipitation from a copper salt solution with a suitable basic compound or, by impregnating a support, such as alumina, zirconia, magnesia and/or silica with the solution of a copper compound.

In column 2, line 57, it is mentioned that after forming such a composition containing the copper compound the precursor is calcined to convert the copper compound. No further features concerning this calcination are mentioned. In particular, Williams does not teach that a relationship exists between volume shrinkage and hardness of the catalyst after removal of the residual anions on the one hand and the content of the residual anions on the other hand.

Claims 1-5 and 7-9 are rejected as being obvious over Williams in view of Krumberger (US 6,501,163).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined)

must teach or suggest all the claim limitations. MPEP § 2143. The examiner has not met any of these three requirements.

Krumberger relates to a process for steam-reforming methanol, in which methanol and water are reacted with a catalyst under formation of hydrogen. The used catalyst can be prepared by precipitating a solution of zinc salts and aluminum salts, whereby the atomic ratio of zinc to aluminum being from 3:1 and 1:3 with an alkali metal carbonate solution or alkali metal hydroxide solution at a pH in the range from 5 to 12 and at from 20 to 100°C. This precipitate is separated off and washed to remove alkali metal ions. Then the precipitate is dried and calcinated at from 250 to 800 °C to give a mixed oxide.

The object of Krumberger is to provide catalysts for steam-reforming methanol which have a high catalytic activity, based on the catalyst volume, and are thus usable with advantage, in particular for mobile application in fuel cells.

The calcination, which is achieved in the process according Williams, comprises a calcinating step. This calcinating step is explained in detail in column 3, lines 15-18 of Krumberger. There it is mentioned that the calcination of the precipitate is done at from 250-800 °C to form a mixed oxide. Nowhere in Krumberger et al. is it mentioned that the calcination of the catalysts is done to an anion content from the precipitating agent of from 0.1-2.5% by weight. Therefore, a combination of Williams and Krumberger does not render obvious the present invention.

Claims 1-7 and 9 are provisionally rejected under the judicially created doctrine

of obviousness type double patenting as being unpatentable over claims 1-8 of copending application 10/090,762. The examiner stated that although the conflicting claims are not identical, they are not patentably distinct from each other. The only difference between the instant claims and the claims of 10/090,762 is that the claims of the copending application does not recite the limitation that reads "to an anion content from the precipitating agent of from 0.1 to 2.5% by weight," however, the property would have been inherently provided by the claims of the copending application, once the calcination step is carried out in the method of making the catalyst.

It is respectfully noted that the present application and the cited copending application 10/090,762 are not commonly owned.

It is further respectfully submitted that the invention disclosed and claimed in the present case is not rendered obvious by the claims and/or the disclosure in copending application 10/090,762.

Claim 1 of the present application, 10/090,763, relates to a catalyst which is obtained by i) precipitating a mixture of catalyst precursor components dissolved or suspended in a diluent with anion-containing precipitating agents, washing and drying to form a solid catalyst precursor in the form of powder or granules, ii) calcining the solid catalyst precursor obtained in stage (i) to an anion content from the precipitating agent of from 0.1 to 2.5% by weight and, (iii) shaping and, if required, reducing and passivating the calcined catalyst precursor from stage (ii) in any desired order to form the catalyst.

As explained in the first paragraph on page 7 of the present application, “a relationship has now been found between volume shrinkage and hardness of the catalyst after removal on the one hand and the residual anion content, in particular residual carbonate content, on the other hand, which permits the controlled optimization of the parameters and hence of the catalyst.”

The invention which is disclosed and claimed in the present application, therefore, relates to a catalyst wherein the hardness is adapted by means of controlling the anion content of the catalyst. With regard to the provision in stage (iii) that “shaping and, if required, reducing and passivating the calcined catalyst precursor from stage (ii)” may be conducted “in any desired order,” the present application provided in the second paragraph on page 7, “the calcined catalyst precursor from stage (ii) can first additionally be reduced, then passivated then subjected to the shaping process. It is also possible for the calcined catalyst precursor from stage (ii) first to be subjected to the shaping process and then to be reduced, the catalyst obtained often no longer being pyrophoric and it therefore being possible to dispense with passivation.”

According to the teaching of the present application, it is therefore not critical at which stage of the catalyst preparation a reduction and subsequent passivation is conducted, and a person of ordinary skill in the art would expect that the point in the preparation of the catalyst at which the reduction and passivation is conducted is of no consequence with regard to the catalyst properties.

The invention disclosed and claimed in Ser. No. 10/090,762 relates to a catalyst

which is obtained by: (1) precipitating or spray-drying a mixture of catalyst precursor components dissolved or suspended in a diluent in order to form a solid catalyst precursor in the form of powder or granules, (2) calcining and reducing the solid catalyst precursor obtained in stage (1), (3) passivating the reduced catalyst precursor obtained in stage (2) and, (4) shaping the passivated catalyst precursor obtained in stage (3) to form the catalyst. Accordingly, a precursor powder or granulate is calcined and reduced and subsequently passivated. Only after the precursor powder or granulate has been pretreated in the requisite manner, the catalyst is formed. Applicants have found that the catalyst exhibits particular properties when precursor powder or granulate is reduced and passivated before the catalyst is shaped. As illustrated by the data set forth in the tables on pages 15 and 16 of copending application 10/090,762, a catalyst which is prepared in accordance with applicants' invention exhibits a distinctly improved hardness and a distinctly reduced volume shrinkage upon use.

Applicants' present invention, therefore is, not rendered prima facie obvious by the claims and/or disclosure of copending application, Ser. No. 10/090,762.

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11-0345. Please credit any excess fees to such deposit account.

Respectfully submitted,
KEIL & WEINKAUF



Daniel S. Kim
Reg. No. 51,877

HOLZLE et al., Serial No. 10/090,763

1350 Connecticut Ave., N.W.
Washington, D.C. 20036
(202)659-0100

COMPLETE LISTING OF ALL CLAIMS IN THE APPLICATION

1. (original) A process for the preparation of a catalyst containing passivated copper and zinc oxide and/or alumina by

(1) precipitating a mixture of catalyst precursor components dissolved or suspended in a diluent with anion-containing precipitating agents, washing and drying to form a solid catalyst precursor in the form of powder or granules,

(2) calcining the solid catalyst precursor obtained in stage (1) to an anion content from the precipitating agent of from 0.1 to 2.5% by weight and,

(3) shaping and, if required, reducing and passivating the calcined catalyst precursor from stage (2) in any desired order to form the catalyst.

2. (currently amended) ~~A~~ The process as claimed in claim 1, wherein, in stage (3), the calcined catalyst precursor from stage (2) is first reduced, then passivated and then subjected to the shaping process.

3. (currently amended) ~~A~~ The process as claimed in claim 1, wherein the catalyst contains alumina in addition to copper and zinc oxide, and solutions of zinc, aluminum and copper salts are precipitated simultaneously or in any desired order in stage (1).

4. (currently amended) ~~A~~ The process as claimed in claim 1, wherein the precipitation in stage (1) is carried out by adding carbonates and the carbonate content is determined as CO₃.

5. (currently amended) ~~A~~ The process as claimed in claim 1, wherein stage (1) is carried out as follows:

- (a) precipitating a solution of zinc and aluminum salts, the atomic Zn:Al ratio being 3:1 - 1:3, with an alkali metal carbonate solution at pH of from 5 to 12 and at from 20 to 100°C,
- (b) separating off and washing the precipitate to remove alkali metal ions,
- (c) drying the precipitate,
- (d) calcining the precipitate at from 250 to 800°C to give a mixed oxide,
- (e) dispersing the mixed oxide in an acidic solution of copper and zinc salts, the atomic Cu:Zn ratio of the solution being 1:5 to 20:1,
- (f) precipitating the dispersion with an alkali metal carbonate solution at a pH of from 6-9 and at from 20 to 100°C,
- (g) carrying out steps (b) to (d),

it being possible for the solution in steps (a) and/or (e) additionally to contain salts or oxides of one or more elements of the platinum metals of groups 4, 5, and 11 and of the lanthanides of the Periodic Table of the Elements or for the salts or oxides to be applied to the mixed oxides.

6. (currently amended) A catalyst ~~obtainable~~ obtained by a the process as claimed in claim 1.

7. (original) A process for the steam reforming of methanol by reacting methanol and water over a catalyst as claimed in claim 6 at from 0.5 to 10 bar and at from 150 to 450 °C.

8. (original) A process for CO conversion with water to form CO₂ and hydrogen, wherein

the reaction is carried out over a catalyst as claimed in claim 6.

9. (currently amended) The catalyst as claimed in claim 6 wherein the volume shrinkage of the catalyst is less than 5% during the operation of the catalyst ~~A process for reducing the volume shrinkage to less than 5% during the operation of catalysts, wherein the catalyst is prepared by a process as claimed in claim 1.~~